



NEXT GENERATION
DEFORMABLE DIE
RING SYSTEMS

3DX Installation 1
at Fong Kee
Success, shows
improvements

AMI conference 1
February 2005
Düsseldorf

Hydraulic innova- 2
tion prevents
'Murphy's Law'
effect

Proportional 2
Pushout Improves
performance of
accumulator head
machines

Simulation Soft- 3
ware enables wall
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Moog ?

Errors in weighing 4
hot drums—Is it
just a load of hot
air?

Leaking News

Special "Industrial Moulders" Issue

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3DX "DEFORMABLE DIE RING" SYSTEM LAUNCHED

Since announcing our intention to produce a product similar to the Feuerherm "PWDS" we have had the most incredible response I have seen in over 25 years. One e-mail said "Thank god somebody has finally done this". A number of machine manufacturers have asked for 'exclusive' deals for their parts of the world, others simply sent orders!

Clearly, moulders have been waiting for someone to offer a competitive system, and we won't disappoint them! It has been really exciting to undertake this project, not to 'knock off' the competition, but to have a fresh look at the system and see what improvements could be made.

To some extent we already knew some of the changes that were needed as we have been servicing the PWDS cylinders and servovalves for many years. Heat had caused seal leakage, and seized valve spools. A re-design of the cylinder mounting arrangement dealt with the heat problem, and selecting the Moog "Direct Drive Valve" meant that dirt sensitivity was virtually eliminated

We also thought that users should be able to strip and reassemble the deformable ring system themselves if they wanted without the horrendous risk of damaging the flexible ring. This turned out to be easily achieved by selecting a cylinder design that allowed us to put the limit stops on the back of the



3DX deformable die ring system

cylinder. The first system fitted worked faultlessly, and we have to thank our friends at Fong Kee, Taiwan, for their help in installing the system on one of their 'L' ring drum machines. A second system installed in the UK on a Kautex KEB30 is also performing to expectations.

AMI CONFERENCE, DÜSSELDORF, 15– 17 FEBRUARY 2005

As moulders of 'Industrial containers' you might think that a conference entitled "Plastic Bottles—Improving value, Function and Performance" is not for you. True the intended slant is towards 'bottles' but from past experience of AMI conferences they have a good spread of relevant technologies. The materials suppliers usually put on a good

'show' of new materials—some that are guaranteed to impact you at some point. Methods of faster cooling may be covered, and different decorative methods. Our paper "Viability of in-house blow moulding" is meant to make companies thinking of going 'in-house' think a bit harder before they make a costly mistake!

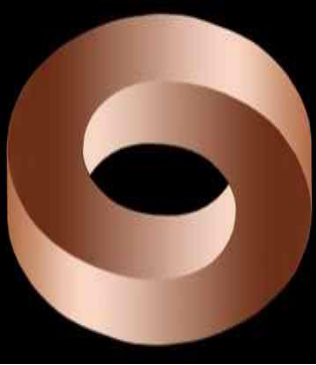
For more details have a look at AMI's web site: Amioplastics.com or call

Evelyn Browne: 0117 3111534

E-mail eb@amioplastics.com

If you move quickly there may still be some "early bird" discounts available

3DX — HOW DOES IT WORK, AND DO YOU NEED IT?



Anyone not familiar with systems like the Feuerherm PWDS may be wondering what on earth this is all about, so here is the absolute beginners guide.

A 'conventional' parison programmer varies the wall thickness over the *length* of the parison. If you measure the moulding around its *circumference* you may find significant variations, particularly on the parting line near the base and top corners. The degree of circumferential thickness variation is also dependant on the shape of the moulding and can be totally unacceptable on asymmetric mouldings like automotive fuel tanks. Machining the die or core to an ovalised shape can compensate for this effect, but the amount of ovalisation is fixed, and only optimum for specific parts of

the moulding. What is needed is varying amounts of ovalisation at different points on the moulding. The 3DX system uses hydraulic cylinders to pull and push a ring into a programmed series of shapes. Although usually aligned to the mould parting line, the system can also be mounted 90° if this is more convenient. The flexible die ring can be pre-squeezed into ovality, shifted from side to side and pulled outward and pushed inward either side of 'round' just by setting the programming unit. Although the system can be used to save weight, it's main usage is to improve the performance of the moulding such as achieving better drop test strength or maintaining minimum wall thickness.

Most 'UN' containers are made with the help of a deformable die ring to meet stringent tests.

**“Murphys law:
If something
can go wrong it
will.**

**3DX Law:
At least try and
prevent it
happening**

NEW HYDRAULIC SAFETY SYSTEM HELPS PREVENT EXPENSIVE DAMAGE

There is one thing that deformable die ring systems really don't like and that is an accidental 'cold start'.

The force from the parison programming cylinder is so powerful that it can easily damage the flexible ring if the material between the core and die is solid. You would think that all you need to do is to interlock the hydraulic start with the temperature controllers 'alarm output' and hey presto, prob-

lem fixed. Firstly many of the older machines may not have temperature controllers equipped with a low temperature alarm output, secondly, it can be beneficial to have the hydraulic oil circulating when the 'heats' are on to carry away the heat from the deformable ring cylinders. Our solution was to fit a solenoid valve under the servovalves to bypass the flow until the die temperature is at a safe level. Not only

does this remove heat from the servovalves it also allows the system to carry out a low pressure flushing cycle. We have also fitted a separate thermocouple receptacle for independently monitoring the die temperature for our cold start prevention system. This gives an extra level of safety in the event the machines temperature controller is faulty or a heater band goes open circuit.

STATICALLY DEFORMABLE CORE — MORE DEVELOPMENT NEEDED?

The device known as 'SFDR' consists of a thin ring that can be deformed by a series of bolts to enable a shaped core to be produced without the time consuming 'hit and miss' process of machining a core. This idea is extremely simple, but quite expensive to produce. Once the shape is optimized to a particular container you won't want to disturb these settings, so you might need to think about keeping a deformable core for every job.

We're looking into ways of getting the cost down and developing a 'setting device' that can be used to re-set the core to a previously optimized shape. This is looking quite feasible, and we hope to give you more details soon. The photo shows a 220mm diameter 'statically deformable' core we recently supplied as an example of our capability, and remember, we are happy to supply components like this as well as complete systems. We are also extending the range down to smaller diameters

for non-industrial sized containers.

These will have considerably fewer setting screws, but will still enable moulders to optimize ovalisation on a wide range of container shapes.



PROPORTIONAL PUSH-OUT IMPROVES CONTROL ON ACCUMULATOR HEADS

Years ago we were told that the deformable die ring systems had serious limitations when used on accumulator head machines. This was quite frustrating as 'in the old days' containers of 25 Lt and up were nearly always produced on accumulator head machines. One problem was that the parison would curl inwards very badly if the ring was deformed during the initial pushout, with the result that the blow pin 'couldn't get in'. This was not a serious prob-

lem on continuous extrusion machines, mainly due to the lower push-out speed. We have solved this problem by fitting a proportional valve to give a controllably slow initial pushout, then 'ramping up' to full speed. Results were perfect, and full deformation was achievable without the parison folding. Fortunately for us the new Moog MPC parison programmer has four channels of control which made things easy:

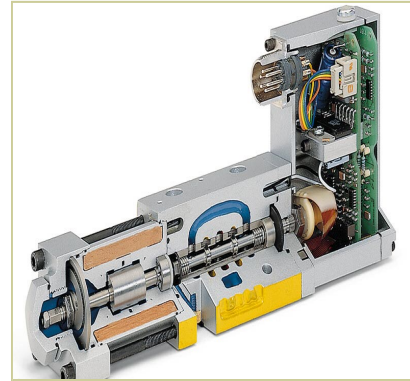
Channel 1

Conventional parison programming.

Channels 2 & 3
Individual control for 3DX

Channel 4

Proportional pushout speed



Moog "Direct Drive Valve"
High flow capability, very low dirt sensitivity, perfect for proportional push-out control

SIMULATION SOFTWARE PREDICTS RADIAL THICKNESS

Unlike normal wall thickness programming, radial programming is much easier because no adjustment of the radial programmer affects any of its profile, or any other settings! Too good to be true? No, because remember that changing the amount of ovality does not change the total area that the parison extrudes from, so there is no change to the linear speed of the emerging parison. Anyone that has spent hours optimizing wall thickness distri-

bution knows that the programmed changes don't always seem to go where you expect—why? Maybe because its hard to imagine the surface mapping as one 3 dimensional shape 'morphs' into another.

Following our discussions with Accuform of Finland, they have agreed to produce a special version of their B-Sim software to predict radial wall thickness distribution. The software analyses the shape of the

moulding and predicts the changes due to stretch. Although the full version of B-Sim is quite expensive, we are hoping to include this special version with each 3DX system we sell.

You can download a full working version at <http://www.b-sim.com/> If you have never tried This is limited to the sample files included with the software.

B-Sim Software
helps understand
what happens to
the parison
thickness as it
stretches in the
mould

WHO REPRESENTS MOOG ? - BEWARE OF FALSE CLAIMS!

A special message from Robin Enderby

Over 20 years ago, the Management at Moog UK agreed that I would be responsible for selling their control systems to the UK plastics industry. This included an agreement that they would supply us with all spare parts to enable us to repair Moog servovalves. To this day, this agreement has not changed. What has happened is that Moog have appointed "regional reps" to promote Moog's repair services. These reps occasionally visit plastic moulders, and in some cases have misinformed customers as to our responsibility. They either had not bothered to find out our arrangement with Moog or in at least one case, deliberately misled the customer into believing that we no longer represented Moog. When we sell a Moog system we are *legally obliged* under the "Sale Of Goods Act 1982" to provide service for that system. As many of you know we have dedicated ourselves to supporting Moog's plastics controls products, and after installing literally hundreds of Moog 25 point parison programmers we are very qualified to give

excellent technical advice, training, and a host of other services. In previous newsletters we have told you about companies that informed customers that they were Moog agents, but often did not send the valves to Moog. When their own 'strip and clean' service couldn't fix the valve they told the customer that the valve was "unrepairable" Naturally when the customer asked for his valves to be returned he was told that they had been scrapped!

Remember, our FULL SERVOVALVE SERVICE typically costs £150, with a 24 hour turnaround, and only genuine Moog parts are used.

All Moog parison programmer cards, transducers, new and refurbished servovalves and complete systems are in stock.

Repair turnaround typically 24 hours.

If anyone tells you a Moog product is unrepairable, call us.



BMC Controls Ltd represents **Moog's** control systems for the plastics industry. We also offer a repair service for **Moog servo and proportional valves**. Our leak testing systems are widely used by **Blow Moulders** in over 30 countries, and we were one of the first to produce full on line quality control systems that incorporated automatic check weighing, top load strength testing and self calibration. Our **SPC and data logging** is seen as an industry 'first' to give moulders traceability of the test results.

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IS WEIGHING DRUMS JUST A LOAD OF HOT AIR?

Because of demanding requirements it is a normal QC procedure to regularly weigh every 'UN' container. Naturally you weigh them as they come off the machine to ensure that corrective action is taken as promptly as possible. At this stage the air inside the drum is usually quite hot as the thick wall section retains a lot of heat. Obviously this prompts the question: If Hot Air balloons float because hot air is lighter than cold, then how accurate is weighing a hot drum? Easy, 60 grams.

A 10Kg, 210 Lt. 'L' ring drum, with the internal air at nearly 100°C will weigh 10.060 Kg 2 hours later. Who says?

Any book on Physics, that's who! The effect is less with smaller containers and lower temperatures, but its still there. So if your target weight is 10Kg then you're giving away 60 grams per drum, and shipping out-of-specification products. If the temperature for any particular container was constant then you could apply a correction factor to the 'hot' reading. We have a formula that takes all the variables into account and calculates the correction factor, and its yours

free! Send your e-mail address to: weigh@bmc-controls.co.uk and we will send you the program. In the meantime we are integrating an internal temperature measurement into our on-line drum weighing systems to correct for the 'hot air' effect.



Automatic drilling, container weighing, leak testing, data logging, and patented feedback weight correction to parison programmer — Standard features, Temperature compensation next !

We would like to thank Geoff Law (ex BP Tech Services) for all the research work he did on this project, Andy Cadman (ex Harcostar) for writing the program and Paul Devaney ('The Rottweiler') for giving us the idea in the first place!